Refine Search

Search Results -

Terms	Documents
L10 and L11	3

Database:

US Pre-Grant Publication Full-Text Database
US Patents Full-Text Database
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Derwent World Patents Index
IBM Technical Disclosure Bulletins

Search: L12

Refine Search

Recall Text Clear Interrupt

Search History

DATE: Sunday, March 13, 2005 Printable Copy Create Case

Set Name side by side	**Query**	**Hit Count**	**Set Name** result set
DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; PLUR=YES; OP=OR			
L12	l10 and L11	3	L12
L11	overrid$3	81693	L11
L10	l6 and L9	4	L10
L9	l4 and L8	5	L9
L8	l1 and l2	61	L8
L7	l5 and L6	0	L7
L6	distance	2564150	L6
L5	l3 and L4	1	L5
L4	obstacle	111064	L4
L3	l1 same L2	9	L3
L2	limit near signal	13654	L2
L1	garage adj door	8984	L1

END OF SEARCH HISTORY

Refine Search

Search Results -

Terms	Documents
L1 same L2	9

Database:
US Pre-Grant Publication Full-Text Database
US Patents Full-Text Database
US OCR Full-Text Database
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Derwent World Patents Index
IBM Technical Disclosure Bulletins

Search: L3

Refine Search

Recall Text Clear Interrupt

Search History

DATE: Sunday, March 13, 2005 Printable Copy Create Case

Set Name side by side	**Query**	**Hit Count**	**Set Name** result set
DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; PLUR=YES; OP=OR			
L3	l1 same L2	9	L3
L2	limit near signal	13654	L2
L1	garage adj door	8984	L1

END OF SEARCH HISTORY

Refine Search

Search Results -

Terms	Documents
L20 and L11	6

Database:

US Pre-Grant Publication Full-Text Database
US Patents Full-Text Database
US OCR Full-Text Database
EPO Abstracts Database
JPO Abstracts Database
Derwent World Patents Index
IBM Technical Disclosure Bulletins

Search: L21

Refine Search

Recall Text Clear Interrupt

Search History

DATE: Sunday, March 13, 2005 Printable Copy Create Case

Set Name side by side	**Query**	**Hit Count**	**Set Name** result set
DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; PLUR=YES; OP=OR			
L21	L20 and l11	6	L21
L20	l17 and L19	190	L20
L19	limit$	4682284	L19
L18	l2 and L17	1	L18
L17	l1 and l15	321	L17
L16	l8 and L15	1	L16
L15	swing$ adj door	11662	L15
L14	l8 and L13	3	L14
L13	swing$	602235	L13
L12	l10 and L11	3	L12
L11	overrid$3	81693	L11
L10	l6 and L9	4	L10
L9	l4 and L8	5	L9
L8	l1 and l2	61	L8

L7	l5 and L6	0	L7
L6	distance	2564150	L6
L5	l3 and L4	1	L5
L4	obstacle	111064	L4
L3	l1 same L2	9	L3
L2	limit near signal	13654	L2
L1	garage adj door	8984	L1

END OF SEARCH HISTORY

Refine Search

Search Results -

Terms	Documents
L59 and L60	23

Database:

US Pre-Grant Publication Full-Text Database
US Patents Full-Text Database
US OCR Full-Text Database
EPO Abstracts Database
JPO Abstracts Database
Derwent World Patents Index
IBM Technical Disclosure Bulletins

Search: L61

Refine Search

Recall Text | Clear | Interrupt

Search History

DATE: Sunday, March 13, 2005 Printable Copy Create Case

Set Name side by side	**Query**	**Hit Count**	**Set Name** result set
DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; PLUR=YES; OP=OR			
L61	l59 and L60	23	L61
L60	obstacle or obstruction	245492	L60
L59	l57 and L58	175	L59
L58	(audio adj signal) and display$	34079	L58
L57	l1 and L56	567	L57
L56	audio and display$	123741	L56
L55	L53 and l1	1751	L55
L54	l52 and L53	0	L54
L53	audio or display$	2271171	L53
L52	6080981.pn. or 4383206.pn.	4	L52
L51	distance and l44	0	L51
L50	L44 and l35	0	L50
L49	sensor and l44	2	L49
L48	audio and l44	0	L48

L47	car and l44	1	L47
L46	l44 and L45	0	L46
L45	vehicle	1865165	L45
L44	6080981.pn.	2	L44
L43	code and l26	1	L43
L42	fault and l26	1	L42
L41	emergency and l26	0	L41
L40	L26 and l11	0	L40
L39	l26 and L38	1	L39
L38	force	2923383	L38
L37	L26 and l6	1	L37
L36	L35 and l26	0	L36
L35	display$	2051422	L35
L34	l32 and L33	20	L34
L33	alarm	233457	L33
L32	l6 and L31	21	L32
L31	l1 and l29 and L30	24	L31
L30	sonar and radar	4261	L30
L29	vehicle	1865165	L29
L28	radar and l26	0	L28
L27	L26 and l6	1	L27
L26	4383206.pn.	2	L26
L25	limit and L24	1	L25
L24	L23 and force	1	L24
L23	4383206.pn. and L22	1	L23
L22	select$	3909044	L22
L21	L20 and l11	6	L21
L20	l17 and L19	190	L20
L19	limit$	4682284	L19
L18	l2 and L17	1	L18
L17	l1 and l15	321	L17
L16	l8 and L15	1	L16
L15	swing$ adj door	11662	L15
L14	l8 and L13	3	L14
L13	swing$	602235	L13
L12	l10 and L11	3	L12
L11	overrid$3	81693	L11
L10	l6 and L9	4	L10
L9	l4 and L8	5	L9
L8	l1 and l2	61	L8
L7	l5 and L6	0	L7

L6	distance	2564150	L6
L5	l3 and L4	1	L5
L4	obstacle	111064	L4
L3	l1 same L2	9	L3
L2	limit near signal	13654	L2
L1	garage adj door	8984	L1

END OF SEARCH HISTORY

L64: Entry 14 of 14 File: USPT Dec 27, 1988

DOCUMENT-IDENTIFIER: US 4794368 A
TITLE: Programmable automobile alarm system having vocal alarm and reporting features

Abstract Text (1):
An alarm system for signaling and reporting the occurrence of an unauthorized entry into a defined area, such as into a closed automobile. The alarm system includes means for generating vocal speech signals that are used to: (1) draw attention to the fact that an unauthorized entry event has been sensed, and .(2) provide reports to indicate the status of the system and to alert the owner of the system that a prior unauthorized event was detected. At installation of the system, several alarm options and features are displayed as easy-to-understand menus on a programming unit used by an installer. The installer can thus readily select which of several available alarm options and features are desired, thereby allowing the system to be easily suited for a particular application. Further, during use of the system, the user of the system can also select various operating modes and report options, thereby providing flexibility in how the system is used. Arming and disarming of the alarm system can occur manually or remotely through the use of a small portable interrogation/set unit. Verification that arming and disarming has occurred is provided through the use of audible and/or visual signals.

Brief Summary Text (11):
Another shortcoming of prior art automobile alarm systems is that the alarm, once triggered, will continue to sound until the system is manually turned off (disarmed). In the case of false triggering, as above described, this shortcoming is not too serious because the owner is right there and can turn off the system quickly. However, if the owner is not present--such as would occur if an unauthorized entry attempt has been made and the would-be intruder has fled from the scene; or, if the owner "loaned" the vehicle to a friend but forgot to tell the friend how to disarm the system; or, if there is some sort of malfunction with the sensor or the control module--such continuous sounding of the loud, attention-getting alarm can create a major nuisance and safety hazard. Accordingly, more sophisticated alarm systems known in the art sound the alarm for only a prescribed time period, e.g. one minute, and then turn the alarm off. However, when the owner returns, such systems typically have no way of notifying the owner that an unauthorized entry event or violation has occurred. While some of the more sophisticated systems will provide some visual (e.g., an indicator light) or audible (e.g., a beeping sound) indication to the owner upon his or her return that a violation has occurred, such indication does not tell the owner when the security violation occurred or, in the case of a system that employs multiple sensors, what type of security violation occurred. Such information, if available, could prove invaluable to the owner as an aid in assessing appropriate action to take and, in situations where actual damage or theft of articles occurred, in completing police and insurance reports. Unfortunately, to communicate such information to an owner using conventional output communication devices, such as printers, CRT or LCD screens, or one-line character displays, would significantly add to the cost and complexity of the alarm system.

Brief Summary Text (12):
It is apparent, therefore, that an alarm system is needed that not only notifies the owner of the occurrence of an unauthorized entry event, but that also informs the owner, without using expensive, cumbersome communication devices (such as printers and visual character displays), of the type and time of occurrence of the unauthorized entry event.

Brief Summary Text (18):
Advantageously, the alarm system herein disclosed uses voice synthesis technology to generate vocal reports and alarms in order to communicate to the owner the status of the system, whether the system is armed or disarmed, and whether and when a particular type of violation occurred. Such voice synthesis technology allows the alarm system's control module to efficiently and effectively communicate to the owner without the need for using additional and expensive communication devices, such as printers and displays, as are conventionally used in the art. Rather, use of vocal communication permits the alarm system to utilize the existing components (e.g. speakers) of the vehicle's radio or tape player, thereby reducing the cost of the system.

Brief Summary Text (22):
The control module used with the alarm system herein disclosed comprises a microprocessor that is programmed to monitor the various sensors and react in a prescribed manner depending upon the particular mode of operation that has been selected. With the microprocessor, there is included an EPROM (Erasable Programmabee Read Only Memory) memory circuit for storing the various programs that define the response the microprocessor takes for a given situation; voice generation circuits for converting digital signals generated by the microprocessor to analog voice signals that can be amplified and played back through the internal and/or external speakers; and various interface or driver circuits for coupling the alarm signals generated by the microprocessor to appropriate alarm components, such as the vehicle's electrical system, a pager, a siren, or other desired display or warning devices. The alarm system also includes a menu control pad (manual switch), through which the owner can manually select a desired mode of operation, fromaa vocal list of possible modes of operation, for the system. One of the options includes an interrogating mode wherein the system provides an oral status report of the system. Another mode allows various tests to be performed. The alarm system, in one embodiment, further includes an RF receiver through which remotely transmitted control signals for the alarm system may be received.

Brief Summary Text (23):
The RF receiver that is included a part of the alarm system of the present invention provides the owner the option of interrogating and/or setting the alarm system to a desired mode of operation from a remote location, such as external to the car, through the use of a portable transmitter. This transmitter is advantageously a very small, light-weight, hand-held device that can be carried, for example, on a key ring. The signals generated by this portable transmitter have a range equivalent to that commonly found in garage-door opener transmitters i.e., approximately 25-150 feet. In one embodiment of the invention, this same transmitter may be used as a garage door opener transmitter as well as the interrogation/set taansmitter of the alarm system.

Detailed Description Text (40):
The programmer unit 105 includes a keyboard 107 and a display 109. Upon turning the system on, a series of menus are displayed on the display 109 that provides to the installer a list of all of the available options and configurations that can be programmed into the system. The installer merely selects the desired item from the menu list by pushing a designated key on the keyboard 107. After all of the menus have been displayed and the desired selections have been made and verified, instructions are displayed on the screen that enable the installer to enter the desired options into the EEPROM 82 of the control unit 34. These instructions

provide for simple key stroke entries that carry out the desired command.

Detailed Description Text (41):
The programmer unit 105, including the keyboard 107 and display 109, is realized using a microprocessor-based system (e.g., a portable personal computer 106) that is programmed with a program as detailed in Appendix B. In the preferred embodiment, the programmer 105 may be realized using any suitable personal computer, such as an NEC model 8210A computer, or an Olivetti model M10 computer. Other computers that could be used include a Radio Shack model 102 or any IBM PC (AT or XT) or IBM compatible personal computer. As those skilled in the art will recognize, most personal or other computer systems currently available in the market could be programmed and used as the programmer 105. The only unique hardware requirement is the inclusion of a serial interface cable having a compatible plug for insertion into the plug 72. Of course, the system must also have the ability to serially send the desired option bits through the interface cable to the control unit 34 at a desirable baud rate (such as 4800 Baud). However, most available computer systems can be readily programmed by those skilled in the art to perform this function.

Detailed Description Text (49):
FIG. 5E shows the schematic diagram for the audio amplifier/driver circuit 86 (FIG. 2). The SPKR signal generated by the voice synsthesizer U13 is first filtered by passing it through the discrete filter made up of resistors R13, R16-R18, R26, R27, and capacitors C19, C28, and C34. Preamplification is provided by the amplifier residing in one-half of U19, a TL072CP device. This is followed by a buffer amplifier, residing in the other half of U19. The amplified and buffered signal is then split into separate channel for the internal speakers. Separate variable resistors, P02 and P03 respectively provide a gain adjustment for each channel. A final stage of amplification for each channel is realized using amplifier/driver U18, a TDA2005 device, for the external speaker, and amplifier U20, a LM380 device, for the internal speaker.

CLAIMS:

4. The alarm system of claim 3 wherein said programming unit includes:

program processing means;

display means connected to said program processing means; and

manual data entry means coupled to said program processing means;

said program processing means having a processing routine loaded therein that provides an installer of the alarm system with a list of options, displayed on said display means, that can be programmed into the non-volatile memory means of the alarm system, a given option being selectable by said installer through the use of said manual data entry means, whereby the installer can select from a displayed list of available options those options that are desired for a given installation of said alarm system.

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L3: Entry 1 of 1 File: USPT Jul 15, 2003

DOCUMENT-IDENTIFIER: US 6593849 B2
TITLE: Wheel lift identification for an automotive vehicle

Abstract Text (1):
A system and method for detecting wheel lift of an automotive vehicle includes a yaw rate sensor (28) that generates a yaw rate signal, a lateral acceleration sensor (32) that generates a lateral acceleration signal, a roll rate sensor (34) generating a roll rate signal, and a longitudinal acceleration sensor (36) for generating a longitudinal acceleration signal. A controller (18) is coupled to the yaw rate sensor (28), the lateral acceleration sensor (32), the roll rate sensor (34), and the longitudinal acceleration sensor (36). The controller determines a dynamic load transfer acting on the plurality of wheels as a function of yaw rate, lateral acceleration roll rate, and longitudinal acceleration. Normal forces for each of the plurality of wheels is determined as a function of the dynamic load transfer. Wheel lift is indicated when at least one of the normal forces for each of the plurality of wheels is less than a normal force threshold.

Brief Summary Text (5):
Typically, the dynamic control systems do not address roll of the vehicle. For high profile vehicles in particular, it would be desirable to control the rollover characteristics of the vehicle to maintain the vehicle position with respect to the road. That is, it is desirable to maintain contact of each of the four tires of the vehicle on the road.

Brief Summary Text (6):
Vehicle rollover and tilt control (or body roll) are distinguishable dynamic characteristics. Tilt control maintains the body on a plane or nearly on a plane parallel to the road surface. Rollover control is used to maintain the vehicle wheels on the road surface.

Brief Summary Text (11):
In one aspect of the invention, a system and method for detecting wheel lift of an automotive vehicle includes a yaw rate sensor that generates a yaw rate signal, a lateral acceleration sensor that generates a lateral acceleration signal, a roll rate sensor generating a roll rate signal, and a longitudinal acceleration sensor for generating a longitudinal acceleration signal. A controller is coupled to the yaw rate sensor, the lateral acceleration sensor, the roll rate sensor, and the longitudinal acceleration sensor. The controller determines a dynamic load transfer acting on the plurality of wheels as a function of yaw rate, lateral acceleration roll rate, and longitudinal acceleration. Normal forces for each of the plurality of wheels is determined as a function of the dynamic load transfer. Wheel lift is indicated when at least one of the normal forces for each of the plurality of wheels is less than a normal force threshold.

Brief Summary Text (12):
In a further aspect of the invention, a method for determining wheel lift of a vehicle comprises the steps of: measuring a yaw rate; measuring a lateral acceleration; measuring a roll rate; measuring longitudinal acceleration; and

determining wheel lift as a function of yaw rate, lateral acceleration, roll rate and longitudinal acceleration.

Drawing Description Text (3):
FIGS. 2A through 2F are top views of an automotive vehicle showing normal force transfers on various corners of the vehicle for respective nominal normal forces, pitch acceleration, roll acceleration, longitudinal acceleration, lateral acceleration, and sway bar characteristics.

Detailed Description Text (3):
Referring now to FIG. 1, an automotive vehicle 10 has a plurality of wheels 12, two of which are shown as elevated above a road plane 14. A rollover control system 16 is included within vehicle 10. The rollover control system 16 is used to counteract the lifting of wheels 12 from road plane 14 as will be further described below. Roll control system 16 includes a roll controller 18 that is preferably microprocessor based. Roll controller 18 may be part of a dynamic stability control system of the automotive vehicle 10.

Detailed Description Text (4):
Roll controller 18 is used for receiving information from various sensors that may include a yaw rate sensor 28, a speed sensor 30, a lateral acceleration sensor 32, a roll rate sensor 34, a longitudinal acceleration sensor 36. Lateral acceleration, longitudinal acceleration, yaw rate, roll orientation and speed may be obtained using a global positioning system (GPS). Based upon inputs from the sensors, controller 18 controls a tire force vector to counter rollover of the vehicle by controlling a change in steering angle of the front and/or rear wheels or controlling braking at various corners of the vehicle. Depending on the desired sensitivity of the system and various other factors, not all the sensors 28-36 may be used in a commercial embodiment.

Detailed Description Text (6):
Roll rate sensor 34 senses the roll condition based on sensing the linear or rotational relative displacement or displacement velocity of one or more of the suspension chassis components which may include a linear height or travel sensor, a rotary height or travel sensor, a wheel speed sensor, a steering wheel position sensor, a steering wheel velocity sensor and a driver heading command input from an electronic component that may include steer by wire using a hand wheel or joy stick. Roll rate sensor 34 may also sense the roll condition of the vehicle based on sensing the height of one or more points on the vehicle relative to the road surface. Sensors that may be used to achieve this include a lidar or radar-based proximity sensor, a laser-based proximity sensor and a sonar-based proximity sensor.

Detailed Description Text (7):
The roll condition may also be sensed by sensing the force or torque associated with the loading condition of one or more suspension or chassis components including a pressure transducer in an active suspension, a shock absorber sensor such as a load cell, a strain gauge, the steering system absolute or relative motor load, the steering system pressure of the hydraulic lines, a tire lateral force sensor or sensors, a longitudinal tire force sensor, a vertical tire force sensor or a tire sidewall torsion sensor.

Detailed Description Text (8):
The roll condition of the vehicle may also be established by one or more of the following translational or rotational positions, velocities or accelerations of the vehicle including a roll gyro, the roll rate sensor 34, the yaw rate sensor 28, the lateral acceleration sensor 32, a vertical acceleration sensor, a vehicle longitudinal acceleration sensor, lateral or vertical speed sensor including a wheel-based speed sensor, a radar-based speed sensor, a sonar-based speed sensor, a laser-based speed sensor or an optical-based speed sensor.

Detailed Description Text (9):
Based on the inputs from sensors 28 through 36, controller 18 determines a roll condition and controls the steering position of the wheels. Controller 18 may also used to control the front right brake, front left brake, rear left brake and right rear brakes. By using brakes in addition to steering control some control benefits may be achieved. That is, controller 18 may be used to apply a brake force distribution to the brake actuators in a manner described in U.S. Pat. No. 6,263,261 which is hereby incorporated by reference.

Detailed Description Text (10):
Speed sensor 30 may be one of a variety of speed sensors known to those skilled in the art. For example, a suitable speed sensor may include a sensor at every wheel that is averaged by controller 18. Preferably, the controller 18 translates the wheel speeds into the speed of the vehicle. Yaw rate, steering angle, wheel speed and possibly a slip angle estimate at each wheel may be translated back to the speed of the vehicle at the center of gravity (V_CG). Various other algorithms are known to those skilled in the art. Speed may also be obtained from a transmission sensor. For example, if speed is determined while speeding up or braking around a corner, the lowest or highest wheel speed may be not used because of its error. Also, a transmission sensor may be used to determine vehicle speed.

Detailed Description Text (15):
Pitch acceleration and pitch inertia may be determined by using other sensor signals such as roll, yaw or lateral or longitudinal acceleration. Of course, other methods for determining pitch acceleration are known to those skilled in the art. The K.sub.PITCH is a constant that is initially set to a value of one and may be slightly altered to account for various phenomena not considered in the normal force estimate.

Detailed Description Text (16):
Referring now to FIG. 2C, roll acceleration has a positive effect on the normal force distribution on the left side of the vehicle and a negative effect on the right side of the vehicle. The roll normal force transfer associated with acceleration is determined by the formula:

Detailed Description Text (20):
where K.sub.LAT ACC is a constant initially set to a value of one which may be altered to account for phenomena not considered in a normal force estimate. The "CG Height Corrected for Roll Angle" is the height of the vehicle center of gravity adjusted for the roll angle assuming that any roll motion is centered about the outside tire-contact-patch.

Detailed Description Text (23):
where the total lateral load transfer is the sum of the load transfer due to the roll acceleration and lateral acceleration.

Detailed Description Text (26):
In a perfect world if the normal force of any of the corners of the vehicle drops to zero, it can be inferred that the wheel has lifted. If a wheel has lifted, a roll over of the vehicle may be impending and corrective measures may be implemented. By inferring the normal the normal forces at each of the wheels by the use of various sensors that do not directly measure normal forces, some error may be present in the calculation. Therefore, a normal force threshold may be set. For example, a normal threshold of plus or minus 1000N may be used. One thousand N will account for any errors due mainly to varying load conditions in vertical acceleration.

Detailed Description Text (28):
In step 60, a counter action of roll over may be performed. As mentioned above

either steering, braking or a combination of the two may be used to compensate for the detection of wheel lift at the corners of the vehicle.

Detailed Description Paragraph Equation (7):
K.sub.LAT ACC *LateralAcceleration*SprungMass/(4*HalfTrack)*"CG Height Corrected for Roll Angle" (Equation 5)

Detailed Description Paragraph Equation (9):
K.sub.SWAY BAR =9e-5*(Front Roll Stiffness(Nm/deg)-Rear Roll Stiffness (Nm/deg)) (Equation 6)

CLAIMS:

1. A method as for controlling an automotive vehicle having a plurality of wheels comprising: measuring a yaw rate; measuring a lateral acceleration; measuring a roll rate; measuring longitudinal acceleration; determining a pitch acceleration; and determining wheel lift as a function of yaw rate, lateral acceleration, roll rate, longitudinal acceleration and pitch acceleration.

2. A method for controlling an automotive vehicle having a plurality of wheels comprising: measuring a yaw rate; measuring a lateral acceleration; measuring a roll rate; measuring longitudinal acceleration; determining a normal force attributable to a sway bar; and determining when a wheel has lifted as a function of yaw rate, lateral acceleration, roll rate longitudinal acceleration the normal force attributable to a sway bar.

5. A method for determining wheel lift of a wheel of an automotive vehicle comprising: measuring a lateral acceleration; measuring a yaw rate; measuring a roil rate; measuring longitudinal acceleration; estimating a normal force acting on the wheel as a function of yaw rate, lateral acceleration, roll rate and longitudinal acceleration; comparing the normal force to a normal force threshold; and indicating when a wheel has lifted when the normal force on the wheel is less than the normal force threshold.

6. A method as recited in claim 5 further comprising determining a pitch acceleration and, wherein determining the normal force as a function of yaw rate, lateral acceleration, roll rate, longitudinal acceleration and pitch acceleration.

7. A method as recited in claim 5 further comprising determining a normal force attributable to a sway bar, wherein determining the normal force comprises determining the normal force as a function of yaw rate, lateral acceleration, roll rate longitudinal acceleration the normal force attributable to a sway bar.

11. A method as recited in claim 10 wherein the normal forces are a function pitch angle.

12. A method as recited in claim 10, wherein the normal forces are a function of road bank angle.

13. A method as recited in claim 10 wherein determining a dynamic load transfer acting on said plurality of wheels comprises measuring a yaw rate; measuring a lateral acceleration; measuring a roll rate; measuring longitudinal acceleration; and determining a dynamic load transfer acting on said plurality of wheels as a function of yaw rate, lateral acceleration, roll rate and longitudinal acceleration.

14. A method as recited in claim 13 further comprising determining a pitch acceleration and, wherein a dynamic load transfer comprises determining a dynamic load transfer as a function of yaw rate, lateral acceleration, roll rate, longitudinal acceleration and pitch acceleration.

15. A method as recited in claim 13 further comprising determining a normal tome attributable to a sway bar, wherein determining a dynamic load transfer comprises determining a dynamic load transfer as a function of yaw rate, lateral acceleration, roll rate longitudinal acceleration the normal force attributable to a sway bar.

17. A system for detecting lift of a wheel of an automotive vehicle comprising: a yaw rate sensor generating a yaw rate signal; a lateral acceleration sensor generating a lateral acceleration signal; a roll rate sensor generating a roll rate signal; a longitudinal acceleration sensor generating a longitudinal acceleration signal; and a controller coupled to said yaw rate sensor, said lateral acceleration sensor, said roll rate sensor and said longitudinal acceleration sensor, said controller determining a dynamic load transfer acting on said plurality of wheels as a function of yaw rate, lateral acceleration, roll rate and longitudinal acceleration, determining normal forces for each of said plurality of wheels as a function of the dynamic load transfer, and indicating when a wheel has lifted when at least one of the normal forces for each of said plurality of wheels is less than a normal force threshold.

18. A system as recited in claim 17 wherein said controller determines a pitch acceleration and, determines a dynamic load transfer as a function of yaw rate, lateral acceleration, roll rate, longitudinal acceleration and pitch acceleration.

19. A system as recited in claim 17 wherein said controller determines a normal force attributable to a sway bar and determines a dynamic load transfer as a function of yaw rate, lateral acceleration, roll rate longitudinal acceleration the normal force all attributable to a sway bar.

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L10: Entry 4 of 4 File: USPT May 10, 1983

DOCUMENT-IDENTIFIER: US 4383206 A
TITLE: Door operation control apparatus

Abstract Text (1):
A motor for operating the door is controlled for forward and reverse rotations and stoppage by a control circuit responsive to an operation command signal, an upper-lower limit signal, an obstruction detection signal and a maximum drive time over signal, thus controlling the door stepwise for opening, stoppage, closing, stoppage and opening in that order. Upon generation of an obstruction detection signal or a maximum drive time over signal during the closing operation, the control circuit controls the motor in a manner to open the door for a certain period of time, and subsequently upon application of an operation command signal, the control circuit is set in a manner to open the door again.

Brief Summary Text (1):
This invention relates to a door operation control apparatus, or more in particular to a door operation control apparatus comprising control means which in response to generation of an obstruction detection signal or a maximum drive time over signal during the closing operation of the door, stops the door after opening for a predetermined length of time or by a predetermined distance.

Brief Summary Text (2):
Generally, an automatic door operation control apparatus for automatically controlling the opening and closing of a garage door in response to an operation command signal comprises door drive means for driving the operation of the door and a control device for controlling the door drive means. The door drive means is so constructed that the turning effort of a motor is converted into reciprocal motion thereby to drive the door along a rail. The control device includes an output control circuit for effecting forward rotation of the motor (for opening or moving up the door), reverse rotation thereof (for closing or moving down the door) and stoppage of the door, operation command signal generator means, condition detector means, and a signal processing circuit for controlling the output control circuit in a manner to drive the door for opening, stoppage, closing, stoppage and opening in that order in response to the operation command signal and the condition detection signal. The operation command signal generator means is provided by a push button switch or a radio controlled command signal transmitter, and the signal processing circuit steps forward the above-mentioned order of driving each time of generation of the operation command signal. When the door in opening operation reaches the upper limit position, an upper limit switch, making up one of the condition detector means, is actuated so that an upper limit detection signal making up one of the condition detector means is generated thereby to cause the signal processing circuit to effect a step forward of the operating sequence in a manner to stop the door. As a result, upon receipt of the next operation command signal, the signal processing circuit controls the output control circuit in a manner to close the door. When the door reaches the lower limit position while being closed, the lower limit switch making up one of the condition detector means is actuated so that the lower limit detection signal making up another condition detection signal is generated, thus causing the signal processing circuit to effect

a step forward of the operating sequence in a manner to stop the door. Thus upon receipt of the next operation command signal, the signal processing circuit controls the output control circuit in such a way as to open the door. If the operation command signal is received when the door is moving between the upper limit position and the lower limit position, the door movement is stopped in the same manner as mentioned above. The condition detector means further includes an obstruction detector switch for detecting that an obstacle such as a person or an object is in the way between the door and the floor. Upon generation of an obstruction detection signal, the signal processing circuit controls the output control circuit in a manner to open the door. The condition detector means further includes a maximum drive time over detector circuit. This maximum drive time over detector circuit is for preventing the door drive means from being energized continuously unnecessarily over a time length longer than a reference time which is the sum of the time required for the door to move normally continuously from the upper limit position to the lower limit position and a predetermined margin time. Such an unnecessary continuous energization of the door drive means occurs in the case where the limit switch or the obstruction detector switch is faulty. In the prior art, upon production of a time over detection signal from the maximum drive time over detector circuit, the signal processing circuit controls the output control circuit in a manner to stop the door thereby to prevent the burning of the door drive means. In the event that a person is held in the way between the door and the floor, however, the mere door stoppage does not provide a satisfactory safety measure.

Brief Summary Text (3):
A patent application is made on an invention of a newly improved garage door operation control apparatus, which corresponds to a U.S. Pat. Ser. No. 123,086 filed on Feb. 20, 1980 (G.B. Pat. Appln. No. 8005766 filed on Feb. 20, 1980 and Canadian Pat. Ser. No. 346268 filed Feb. 22, 1980). According to this prior application, upon generating of an obstruction detection signal or a time over detection signal during the closing of the door, the signal processing circuit controls the output control circuit in a manner to stop the door after opening for a predetermined length of time. In this way, even if the door holds an obstacle while the obstruction detector switch is out of order, the door opens for a predetermined length of time after detection of a maximum time over, thus safely releasing the obstacle. This is also the case when the obstruction detector switch is operating normally.

Detailed Description Text (1):
As shown in FIG. 1, a garage door operating device for which a control apparatus according to the present invention is used comprises essential parts including a body 1 housing a driving mechanism, a rail 2 coupled with the body 1, and a trolley 4 guided by the rail 2 and adapted to be horizontally moved, the trolley 4 being secured to a roller chain actuated by the driving force of the body 1. The body 1 is hung from the ceiling of the garage by a hanger, and an end of the rail 2 is secured to part of the garage by a header bracket 5. A garage door 6, on the other hand, is generally divided into several parts coupled to each other and is opened and closed along door rail 7 on both sides thereof. The weight of the garage door 6 is balanced with a door balance spring 8 and is capable of being operated manually. A door bracket 9 is secured to the garage door 6. The door bracket 9 is rotatably coupled to the trolley 4 through a door arm 10. Thus the garage door 6 is closed or opened along the door rail 7 in an interlocked relation with the roller chain 3 actuated by the driving force of the body 1 and the trolley 4 horizontally moved along the rail 2 by actuation of the roller chain 3. Power is supplied to the body 1 through a power cable 11.

Detailed Description Text (2):
A command for operating the body 1 is issued to the body 1 by depressing a push button switch 12 mounted on the wall of the garage or from a control 13 housing a receiver for receiving a signal in the form of electric wave or the like. Should

the garage door operating device be rendered inoperative by a power failure or a like accident, a releasing string 14 decouples the roller chain 3 and the trolley 4, thus making the garage door 6 ready for manual operation.

Detailed Description Text (3):
The construction of the body 1 of the garage door operating device will be explained with reference to FIGS. 2 and 3. FIG. 2 is a longitudinal sectional view and FIG. 3 a partially cut-away top plan view of the body 1. The turning effort of a motor 16 secured to the lower side of the body frame 15 is transmitted to a motor pulley 17 secured to a motor shaft 16-a, a V-belt 18 and a large pulley 19. Further, the turning effort of the large pulley 19 is transmitted to a sprocket 21 through a sprocket shaft 20.

Detailed Description Text (7):
Next, a limit mechanism for limiting the horizontal movement of the trolley 4, i.e., the upper and lower limits of the operation of the garage door 6 explained with reference to FIG. 1 will be described. The amount of movement of the roller chain 3 is converted into the amount of movement of a pulley rack 28 provided on the outer periphery of the large pulley 19 rotated at the same rotational speed as the sprocket 21. The amount of movement of the pulley rack 28 is transmitted to an upper limit switch 30 and a lower limit switch 31 through a pinion 29 in mesh with the pulley rack 28.

Detailed Description Text (9):
In the case where the garage door encounters an obstruction during the downward motion thereof, it must be immediately detected and the door operation is required to be reversed, i.e., it must be moved upward for safety's sake. If the garage door strikes an obstruction during the upward motion thereof, on the other hand, it must be detected and the door must be stopped immediately for safety's sake. The above-mentioned obstruction detecting mechanism will be described below.

Detailed Description Text (11):
A lamp 38 is for illuminating the inside of the garage, which lamp 38 is adapted to be turned on or off in response to the movement of the garage door. Further, a controller 39 for controlling the motor 16 and the lamp 38 is secured within the frame 15. A body cover 40 and a lamp cover 41 cover the motor 16, the large pulley 19 and the lamp 38. The lamp cover 41 is translucent and allows the light of the lamp 38 to pass therethrough, thus brightly illuminating the inside of the garage. The foregoing is the description of the construction of the body of the garage door operating device. Next, the rail and the trolley will be explained below with reference to FIGS. 4 and 5.

Detailed Description Text (12):
The rail 2 is formed of a thin iron plate or a plastic plate and is used to slidably guide the trolley 4 along the outer periphery thereof. The rail 2 holds the rollers of the roller chain 3 from both sides thereof thereby to reciprocate the roller chain 3 in a straight line. The trolley 4 and the roller chain 3 are coupled to each other in such a way that a connecting metal 4-a is inserted into a slot formed in the roller chain attachment 3-a secured to the end of the roller chain 3 and guided in the same manner as the roller chain 3. The connecting metal 4-a is slidable within the trolley 4 and is normally held up by the force of a spring or the like, thus coupling the trolley 4 with the roller chain 3. In the event of a power failure or other accident when the door is required to be operated by human power by separating the garage door operating device from the door, the connecting metal 4-a is pulled down and separated from the roller chain attachment 3-a. The door arm 10 for transmitting the operation of the trolley 4 is comprised of an L-shaped door arm portion 10-a and a straight door arm portion 10-b which are coupled with the length thereof determined freely depending on the positional relation between the door and the rail. An end of the door arm 10 is connected to the trolley 4, and the other end thereof is connected to the door 6 through the

door bracket 9 shown in FIG. 1. The door arm 10 and the trolley 4 are connected with each other in such a manner that a pin 4-c is inserted into the slot 4-b of the trolley 4. The pin 4-c is normally kept pressed as shown in FIG. 4. This is for the purpose of absorbing the shock which will occur if the door collides with an obstruction while moving down and also provides for a soft landing of the door during normal downward operation as the door reaches the floor.

Detailed Description Text (15):
The diagram of FIG. 6 shows a flow chart illustrating the sequence of the fundamental operations of the garage door. In FIG. 6, after power is thrown in, the garage door 6 is in the stationary state 303. In response to each operation command, the garage door 6 repeats the processes including the upward movement 300, stationary state 301, downward movement 302 and stationary state 303 in that order. Apart from these operating commands, the door 6 promptly transfers to the stationary state 301 through the state 307 when an input is applied from the upper limit switch 30 in response to the garage door 6 in the upward movement mode 300. When an input signal is applied from the lower limit switch 31 in response to the garage door 6 in downward movement 302, by contrast, the door 6 transfers to the fixed-time downward movement 304 through the state 309, and after the fixed time, it enters the stationary state 303. The reason for which the door moves down for the fixed time length will be explained later in detail.

Detailed Description Text (16):
Now, explanation will be made about the action to be taken when the movement of the garage door 6 is stopped to secure the safety thereof. In the case where an obstruction detection signal is applied while the garage door 6 is moving up, it promptly enters the stationary state 301 through the state 308. In the presence of an obstruction detection input during the downward movement of the garage door 6, on the other hand, the door transfers to the temporary stationary state 305 through the state 310, and after a fixed time length, transfers to the state 306 one foot higher. This one-foot rise is time controlled, so that after a predetermined length of time, the door transfers to the stationary state 301. Assuming that an input signal is applied from the upper limit switch 30 while the door is moving upward by one foot as mentioned above, however, the input from the upper limit switch 30 is given priority, so that the door 6 immediately transfers to the stationary state 301.

Detailed Description Text (19):
The processes for controlling the garage door according to the present invention as mentioned above will be explained more in detail later with reference to the flow charts of FIGS. 14 to 37.

Detailed Description Text (20):
A basic block diagram of the control section is shown in FIG. 7. The control section basically comprises an input circuit 312, a logic processing circuit 311, and an output circuit 313. The input circuit 312 is an interface circuit having what is generally called a signal level conversion function, which circuit is impressed with signals representing the conditions of the garage door 6, from the upper limit switch 30, the lower limit switch 31, the obstruction detection switch 52 and a signal for operating the garage door 6 from the push button switch 12 or the receiver 330 for radio control. These signals are processed in optimum manner according to the processing steps stored in advance, and the resulting output is produced. This output signal is amplified by the output circuit 313, thereby subjecting the motor 16 to forward-reverse control and the in-garage illumination lamp 38 to on-off control.

Detailed Description Text (24):
A door indicator circuit 325 for indicating the conditions of the garage door 6 and an intruder preventing alarm circuit 326 which are included in the output circuits of the logic processing circuit 311 will be explained in detail later.

Detailed Description Text (25):
The push button switch 12 is a door operating switch mounted on the base of the control device 13, apart from which there is provided a ratio control operating command system utilizing the transmission-receiving functions. This is for operating the door from a position distant from the garage and used an electric wave of UHF band. For operation, first, the bit setting section contained in the transmitter 331 and the bit setting circuit 321 within the control device 13 are set appropriately. The data supplied sequentially from the transmitter 331 include bit data thus set. The format of the data will be explained later in detail. The data thus supplied are modulated and converted into a binary number signal at the receiving circuit 330 and applied to the logic processing circuit 311. The receiving circuit used in this case mainly comprises a super-regeneration circuit. The date supplied are compared with the data stored in the bit setting circuit 321 sequentially, and only when all the bits are coincident, they are processed as an operating signal. Naturally, if bits are set improperly, the garage door is incapable of being operated.

Detailed Description Text (27):
Next, the configuration of the logic processing circuit 311 will be explained with reference to FIG. 9. In order to control the garage door in optimum manner, the circuit 311 comprises a program memory circuit 340 (which in this case is a read-only memory (ROM)) for storing programmed data on the processing sequence in advance, a command register 341 for temporarily storing a command code read out of the program memory circuit 340, and a command decoder 342 for decoding the command code stored in the command register 341. The entire circuits are operated in response to a timing pulse produced from the timing control circuit 351 for controlling the operation timing of the entire circuits and the command code. A program counter 343 is provided for designating and updating an address of the command code for the program memory circuit 340. The program counter 343 is connected with a stack register 344 used for storing the return address in the case of a skip such as a subroutine jump.

Detailed Description Text (28):
Further, the circuit 311 comprises a logic calculation circuit 345 for logic operation, a condition indication register 346 for temporarily storing the result of the logic calculation, a register 347 such as an accumulator used for logic calculation, and temporary memory circuit 349 (which employs a random access memory (RAM)) for storing the result of logic operation or a status flag such as the present condition of the garage door ("1" in operation, and "0" in stoppage). A buffer register 348 is addressed by the logic calculation circuit 345, and the main circuits are connected by a bus line 352. The bus line 352 is also connected with the input-output circuit 350, so that the input-output condition applied through the bus line 352 is processed by logic decision means including the logic calculation circuit 345, the register 347 and the condition indication register 346.

Detailed Description Text (33):
Next, the sequence of operation of the garage door according to the present invention will be explained specifically.

Detailed Description Text (34):
The operation sequence of the garage door is already explained with reference to FIG. 6. Before referring to the flow charts, items to which special attention shall be paid will be described in connection with the date to be processed.

Detailed Description Text (40):
The motor used for the garage door is generally rated for a short time, and if it is operated continuously in repetitive fashion, the thermal switch 192 for the motor is actuated. As a result, unless the motor housing is cooled, the thermal

switch 192 is not restored, thus rendering the garage door inoperative for about 20 minutes. Such a situation is not likely to occur under normal operating conditions but may be caused by mischief of children in most cases. Especially when children's mischief causes very frequent actuations of the thermal switch 192, the motor life is shortened undesirably on the one hand and a serious accident may occur on the other hand. As one method for preventing such an unfavorable situation, a number-of-starts control algorism as shown in FIG. 11 is employed in this embodiment.

Detailed Description Text (47):
This is for indicating the condition of the garage door shown in FIG. 1 and comprises such specific elements as a lamp and a door indicator circuit 325 for turning on and off a light-emitting diode. An example of the light-emitting diode turned on and off is shown in FIG. 12.

Detailed Description Text (49):
In the case where the upper limit switch 30 or the lower limit switch 31 for setting the door motion range gets out of order, the door runs against the floor if going down or runs against the upper stopper if going up, thus actuating the obstruction switch 52. If the obstruction switch 52 is out of order, however, the door continues to be pressed against the obstruction strongly until the motor generates a lock torque and turns on the thermal switch 192. This condition is not desirable for safety and must be prevented in the manner mentioned below. In view of the fact that the distance covered by the door is limited to, say, 9 feet or 2.7 m, the time required for coverage is naturally limited. For instance, if the door runs at the speed of 10 m/min., the time required T.sub.T is 16 seconds (2.7 divided by 10, and the resulting minutes converted into seconds). In the event that with the timer TM.sub.8 set after starting the operation of the door, the upper limit, lower limit or obstruction signal fails to be applied before time over of the timer TM.sub.8, the condition is judged as abnormal and the obstruction detecting processing function is performed. This function is effective to secure safety in that the motor is stopped within a predetermined time in the case where, for instance, the door fails to operate due to a fault of part of the driving system or specifically, the turning effort is not transmitted due to a belt slip which heats the belt and the belt is liable to be broken.

Detailed Description Text (51):
Generally, the friction is divided into static and dynamic frictions, the former being greater than the latter. This is also the case with the door garage. At the time of starting the operation of the garage door, for instance, a great force is required, although during the door operation, so great a power is not required. In order for the obstruction detection switch 52 to fail to be actuated at the time of door operation start, an operation setting value must be made great, with the result that the ability to detect an obstruction against the door in operation represents a great value. This contradicts the small power for obstruction detection which is required for high door operating efficiency and safety. To overcome this problem, this embodiment of the invention is such that the obstruction detection is ignored for a predetermined length of time, or one second in this case after starting the door operation. This is based on the assumption that every door remains in adequately steady operation at least for one second after start.